Appendix F: Travel Demand Model

The regional travel model used for the St. George area is the QRSII model. The QRSII model uses number of dwelling units, plus retail and nonretail employment statistics, as inputs to determine the travel patterns within the defined roadway network. In other words, where each person lives and works determines future system traffic.

The original QRSII model was created in 1994 by UDOT Planning and was calibrated using 1994 data. St. George used the model to develop the City's Traffic and Transportation Master Study. Since 1994, the model was used to develop the St. George Master Traffic and Transportation Study (April 1995) for the planning years 1994, 2000, 2005, and 2015 and the Washington City Transportation Master Plan (May 1996) for the planning years 1994 and 2015.

As discussed in another section, this model's development, application, and continued use has been in coordination with St. George and the Five County Association of Governments that serves as the nucleus of the future MPO. Each of these organizations actively contributed to the refinement of the QRSII model for use in the Southern Corridor EIS.

Within the model, smaller subareas called traffic analysis zones were defined. Each traffic analysis zone is generally made up of similar socioeconomic land areas. Links were added within the traffic analysis zones to represent the roadway system. The links have associated attributes including capacity, travel speed, traffic volumes, transit characteristics, and directional information. The model was calibrated for 1994.

The QRSII model follows the conventional four-step travel forecasting process including trip generation, trip distribution, mode split, and traffic assignment.

Trip generation defines the number of person-trips that are produced at and attracted to each traffic analysis zone. To arrive at the number of person-trips by traffic analysis zone, the model uses dwelling unit, average income, and retail and nonretail employment forecasts. The model considers the purpose of each trip (that is, whether it is travel to employment, retail commercial, or nonretail commercial) since driver behavior would vary for these three travel destinations. For example, people are generally willing to drive farther and endure greater levels of congestion when commuting to work than when going to the grocery store. Therefore, the trip generation step provides an estimate of trips by purpose.

Trip distribution takes the trip determined for each purpose in the trip generation step and predicts the number of person-trips that go from a production zone to an

attraction zone. The paired production and attraction zones are called origin-destination pairs. The number of trips in each origin-destination pair depends on the number of trip productions in the production zone, the number of trip attractions in the attraction zone, and the travel time between the production and attraction zone.

Mode split addresses transit ridership forecasts. Essentially, for each origin-destination pair, the model determines the percentage of transit trips that occur and the complementary percentage of automobile trips that occur. The QRSII model for the St. George area was set up and calibrated before the start of the current transit system, so mode choice is not included in the model.

For the traffic assignment, person-trips are converted to vehicle-trips, which are then assigned to the roadway network according to the travel times determined in the trip distribution step. The capacities of each link and associated intersections are determining factors in the trip assignment step. The trip assignment model develops estimates of traffic volumes on every roadway link in the network, taking into account the relationship between the estimated traffic on each roadway link and the capacity of the link. The assignments are made for an average 24-hour weekday.

The results of the traffic modeling are provided in Chapter 1, Purpose of and Need for Action.

A technical group led by UDOT met to discuss the validation of the QRSII model being used for travel demand forecasting for the Southern Corridor. The set of model inputs and parameters for the base (calibration) year and the future study years were reviewed, including transportation network, socioeconomic data, model parameters, and internal-external/external-external trips. The results of the review by the technical committee concluded that the QRSII software, model validation process, and the future forecast are reasonable for the analysis necessary for the Southern Corridor EIS. This conclusion was sent in a letter to FHWA dated June 17, 2002 (see below).

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June 17, 2002

Mr. Harlan Miller
Federal Highway Administration
2520 West 4700 South, Suite 9A
Salt Lake City, Utah 84118

Subject: Southern Corridor QRSII Model Certification

Dear Harlan:

A technical review group met today to discuss the validation of the QRSII Model being used for travel demand forecasting for the Southern Corridor EIS. The group included representatives from UDOT Planning, Fehr & Peers Associates, Inc., and Steve Lewis, the developer of the original model.

After review and extensive discussions of the various inputs to the modeling process, we have determined that the modeling process is reasonable for this project. Input parameters were based on National default values (NCHRP 187 or 365). Output values were compared to ground traffic counts, or published national data (NCHRP 187, 365, and Calibration and Adjustment of System Planning Models, FHWA 1990). At every step of the modeling process, the consultants met with local government officials to review model parameters to achieve agreement.

The set of model inputs and parameters for both the base (calibration) year and the future study years were reviewed and include:

Transportation Network (including roadway, delay penalties, centroids)
Socio-economic data (population, employment)
Model parameters (productions, attractions, mode split)
Internal-External, External-External trips

The results of this discussion are that the QRSII software, the model validation process, and the future forecasts are reasonable for the analysis necessary for the Southern Corridor EIS. This is an appropriate application for the Southern Corridor transportation forecasting needs.

Sincerely,

W. Walt Steinvorth

Walt Steinvorth
Urban Planning

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